TABLE OF CONTENTS

EXECUTIVE SUMMARY **1**

BACKGROUND 1
BACKGROUND RESEARCH 1
EVALUATION APPROACH 2
FINDINGS AND RECOMMENDATIONS 2
NEXT STEPS 3
ORGANIZATION OF THIS REPORT 3

1.0 BACKGROUND DEVELOPMENT **4**

1.1 SUMMARY OF SAMPLING RESULTS 4
1.2 SUMMARY OF TECHNICAL REVIEW OF ARWT FACILITIES 5
1.3 NEXT STEPS – BACKGROUND DEVELOPMENT 5

2.0 MARKET ASSESSMENTS **6**

2.1 MARKET ASSESSMENT CONCLUSIONS 6
2.2 SUMMARY OF AGRICULTURAL MARKET ASSESSMENT 6
2.3 SUMMARY OF LANDSCAPE MARKET ASSESSMENT 7
2.4 SUMMARY OF INDUSTRIAL MARKET ASSESSMENT 8
2.5 SUMMARY OF ENVIRONMENTAL MARKET ASSESSMENT 9
2.6 NEXT STEPS – MARKET ASSESSMENTS 10

3.0 GROUNDWATER AND SURFACE WATER RESOURCES AND FACILITIES ASSESSMENT **11**

3.1 GROUNDWATER ASSESSMENT 11
3.1.1 Constituents of Concern *11*
3.1.2 Agricultural and Large Landscape Irrigation Use *13*
3.1.3 Groundwater Recharge Applications *13*
3.1.4 Soil/Aquifer Plugging Potential *13*
3.2 SURFACE WATER ASSESSMENT 14
3.2.1 Potential Reservoir Augmentation Sites *14*
3.3 NEXT STEPS – GROUNDWATER AND SURFACE WATER ASSESSMENTS 14

4.0 STAKEHOLDER INVOLVEMENT PROCESS **15**

4.1 SUMMARY OF STAKEHOLDER INVOLVEMENT PLAN 15
4.2 IMPLEMENTATION OF STAKEHOLDER INVOLVEMENT 15
4.2.1 Initial Focus Group Workshops *17*
4.2.2 Demonstration Scale Project Screening Process *17*
4.2.3 Combined External Stakeholder Workshop *17*
4.2.4 Full Scale Project Screening Process *18*
4.3 NEXT STEPS – STAKEHOLDER INVOLVEMENT 18

5.0 SELECTION OF POTENTIAL PROJECTS **19**

5.1 DEVELOPMENT OF POTENTIAL PROJECTS 19
5.2 DEMONSTRATION SCALE PROJECTS 19
5.3 FULL SCALE POTENTIAL PROJECTS 21

6.0 REGULATORY REVIEW AND INTEGRATED PERMITTING STRATEGY PLAN **23**

6.1 NEXT STEPS - REGULATORY REVIEW AND PERMITTING 25

7.0 FINANCIAL ANALYSIS **26**

7.1 FUNDING OPPORTUNITIES 26
7.1.1 Summary of Funding Opportunities 26
7.2 FINANCIAL ANALYSIS 27
7.3 NEXT STEPS - FINANCIAL ANALYSIS 28

8.0 EVALUATION OF POTENTIAL PROJECTS 30

8.1 DEMONSTRATION SCALE PROJECTS 30
8.1.1 Demonstration Scale Projects – Findings 30
8.2 FULL SCALE PROJECTS 32
8.2.1 Full Scale Projects – Findings 32
8.2.2 Full Scale Projects - Recommendations 35
8.2.3 Integration with Other Initiatives 35
8.2.4 Next Steps 36
8.2.5 Recommended Areas of Further Study 36

EXECUTIVE SUMMARY

This feasibility report presents an overall summary of the work performed as a part of the Advanced Recycled Water Treatment Feasibility Study (ARWT). This report includes a description of the background studies that were conducted; the alternative projects that were developed and evaluated for utilizing advanced recycled water treatment technologies; and the findings and recommendations for proceeding with further development and implementation of advanced recycled water treatment projects.

Background

The District manages both surface and groundwater systems in Santa Clara County and supplies wholesale water to retailers including municipalities and private water companies. As the County's population grows and demands for water increase, the District has developed a number of programs to ensure a high-quality, reliable supply to its service area.

Water resources management efforts at the District are guided by policies of the Board of Directors and include the Integrated Water Resources Planning effort (IWRP). One objective of the Board policies is to expand the use of water recycling in Santa Clara County in partnership with the community, consistent with the IWRP and other District policies for providing a reliable supply of healthy, clean drinking water, and aggressively protecting groundwater basins from contamination. The District's targets for water recycling in the county are 5 percent of total water use by 2010, and 10 percent of total water use by 2020.

The Advanced Recycled Water Treatment Feasibility Study has been performed to assess the feasibility and need of providing higher quality recycled water than is currently available at wastewater treatment facilities in the District's service area and/or providing greater volumes of recycled water for a variety of market types and uses, including large landscape and agricultural irrigation, industrial and environmental uses, and for augmenting both potable and non-potable water supplies. In keeping with its public involvement policy, the District has conducted the ARWT Study in consultation with stakeholder groups and other interested parties.

Background Research

In June 2001, the District contracted with the Black & Veatch – Kennedy/Jenks Consultants team to conduct initial studies and develop potential ARWT projects that would evaluate promising approaches to using increased amounts of recycled water. The team's evaluation approach combined extensive background research with public and stakeholder meetings, prior to and as a part of the development and evaluation of potential ARWT projects. The goal of these initial studies was to ensure that the District has reliable technical information about the potential recycled water markets and the water quality requirements that would need to be met in order to achieve public and regulatory acceptance and conform to District Board policies. The primary components of this background research effort included: a thorough sampling program of potable water sources and wastewater treatment plants in the County; a comprehensive assessment of potential markets for recycled water use; development of a Stakeholder

Involvement Plan; and an assessment of impacts of recycled water use on groundwater and surface water supplies. Detailed documentation of these efforts is presented in Technical Memoranda No. 1 through No. 4, included as appendices to this report.

Evaluation Approach

Following the compilation of background research, the District, the consultant team, and project stakeholders selected potential projects for evaluation. These projects include three demonstration scale projects, each with a plant capacity of one million gallons per day (MGD), and based on further external stakeholder input, five full scale projects, ranging in size from 11 MGD to 45 MGD. These alternatives incorporated a variety of advanced treatment technologies to meet the needs of a broad base of recycled water users located in different groundwater subbasins throughout the County.

As a part of the evaluation process of projects, the team reviewed applicable regulations and developed permitting strategies for each project, in addition to an evaluation of life cycle costs and potential funding opportunities for each alternative. These project specific regulatory and financial analyses are presented in Technical Memoranda No. 5 and No. 6, also included as appendices to this report.

The evaluation of the eight potential projects included several meetings with District stakeholders, comprising a Technical Advisory Group, as well as workshops with external stakeholder groups. The potential projects were evaluated relative to criteria that were agreed upon among all stakeholder groups.

Findings and Recommendations

Based on the project team's analyses, stakeholder input, and a review of findings by other agencies, it was determined that demonstration scale projects may not be a necessary step, as these projects would in some cases improve water quality above recycled water supplies which are currently being distributed for similar uses in the County. In other cases, the very high levels of treatment produced by these demonstration projects appear to address the concerns voiced by groundwater and environmental specialists, as well as those raised by external stakeholders, thus obviating the need for demonstration scale efforts.

Among the five full scale projects, two of the alternatives were considered most appropriate for further consideration: a 15 MGD project in the Coyote Valley and an 11 MGD project at the South County Regional Wastewater Authority (SCRWA) Water Pollution Control Plant (WPCP). It was determined that these two potential projects:

- Are relatively lower cost options, have broad user bases throughout the year, and provide many opportunities for partnering, cost sharing, and external funding;
- Are designed to expand recycled water use while providing the appropriate level of treatment to protect local groundwater supplies from degradation;

- Are located in areas with considerable recycled water markets and, due to their modular design, are easily expanded to build towards District recycled water targets;
- Are expected to provide expanded information and understanding of recycled water uses and are anticipated to receive greater levels of public acceptance; and
- Are suitable near-term projects that could provide an excellent first step into advanced recycled water treatment, while providing long-term research and educational benefits with respect to groundwater recharge and reuse, as well as streamflow augmentation.

Next Steps

The following next steps are recommended for the District for proceeding with the implementation of advanced recycled water treatment in the County:

- Continue coordination and integration with other District programs;
- Identify funding sources, including grants and partnerships with other agencies;
- Expand its public outreach efforts; and
- Prepare engineering documents and supporting environmental documentation; both precursors to project permitting and construction.

The integration of these key steps will assure that the District is utilizing advanced recycled water treatment as a part of a "master planned" effort will make the most effective use of District resources and maximize the benefit gained from other efforts within and external to the District.

Organization of This Report

The information presented in this report is organized as follows:

Executive Summary

Section 1 Background Development

Section 2 Market Assessments

Section 3 Groundwater and Surface Water Resources and Facilities Assessment

Section 4 Stakeholder Involvement Process

Section 5 Selection of Potential Projects

Section 6 Regulatory Review and Permitting Strategy Plan

Section 7 Financial Analysis

Section 8 Evaluation of Potential Projects

1.0 BACKGROUND DEVELOPMENT

This section summarizes the findings of the sampling program and review of historical data that was conducted to establish baseline conditions for the development of ARWT project alternatives. The program included a review of historical water quality of surface water and groundwaters within the Santa Clara Valley as well as tertiary treated wastewater effluents generated in this region. The primary focus of the program was an extensive sampling and analysis protocol, entitled the Water Quality Sampling Program, created and conducted to determine the overall water quality and the presence of known and emerging contaminants. In addition to the sampling program, summaries have been prepared describing the operating conditions and treatment processes utilized at five ARWT facilities currently in operation.

Results of the Water Quality Sampling Program and technical reviews of ARWT facilities are presented and discussed in detail in Technical Memorandum No. 1, Background Development, included as Appendix A.

1.1 Summary of Sampling Results

Ten locations were chosen to investigate the water quality of surface water, groundwaters, and tertiary treated wastewaters in Santa Clara County. These locations are: Anderson Reservoir (surface water); Coyote Creek Outdoor Classroom (shallow {60-70 foot depth}, and deep groundwater {405-425 foot depth}), Coyote Valley (unconfined groundwater at 100 foot depth), and Gilroy (shallow groundwater – 95-100 foot depth and deep groundwater – 135-170 foot depth); and Sunnyvale WPCP, San Jose/Santa Clara WPCP, SCRWA WPCP, and the Palo Alto RWQCP (all tertiary effluents).

Historical data were augmented with laboratory results from the Water Quality Sampling Program, which was comprised of three samples from each location (one sample from the Palo Alto RWQCP) taken over a 9-month period (November 2001, March 2002, and July 2002). Approximately 280 water quality constituents were measured including general parameters, inorganics, regulated and unregulated organics, microbial and radioactive constituents.

Water quality differences and similarities were observed between the waters studied. Compared to the surface water and the groundwaters, the tertiary effluents may be characterized as being generally higher in total organic carbon (TOC), total dissolved solids (TDS), nitrate, phosphate, disinfection by-products (DBP), and select anthropogenic compounds. Similar levels of pH, select inorganic ions, synthetic and natural hormones as well as similar microbial quality were observed in the waters studied. In addition, the vast majority of regulated organic compounds in all samples were not detected.

Average TDS levels in the tertiary effluents ranged from 650 to 840 mg/l compared to average surface water and groundwater levels of 280 to 590 mg/l. The surface water TDS concentrations were less than TDS concentrations in groundwater in all cases. Average Nitrate levels, while not detectable in the surface water, ranged from 1.2 to 14 mg-N/l in the groundwater samples. The tertiary effluents' average Nitrate levels were higher, from 1.6 to 19.2 mg-N/l. All DBP were not

detectable in the surface water and all groundwaters, whereas the tertiary effluents generally contained levels of THM and HAA5 above drinking water regulatory limits. NDMA was detected in all tertiary effluents at substantial concentrations; one sample exhibited very high levels (490 ng/l).

Very few surface water, groundwater, or tertiary effluent samples exhibited quantifiable concentrations of the four synthetic and natural hormones measured. The levels measured were near quantification limit and not repeated seasonally. In this regard, there does not appear to be a difference between the tertiary effluents and the other sampled waters. Anthropogenic compounds considered to be wastewater indicator compounds were measured. Detergent constituents and their metabolites were measured at trace and variable levels in the surface and groundwaters. Levels of these compounds in the tertiary effluents were found at three orders of magnitude greater than the surface and groundwaters, and within the range of other studies. In addition, select pharmaceuticals were found in the tertiary effluents and not surface and groundwaters.

1.2 Summary of Technical Review of ARWT Facilities

Five completed ARWT projects were investigated and their processes and water quality data summarized. These include the Los Angeles County Sanitation District Reclaimed Water Artificial Recharge Project, Orange County Water District Water Factory 21, the Upper Occoquan Sewage Authority Reservoir Augmentation Project, the City of Scottsdale, Arizona Water Campus, and the Dublin San Ramon Services District Clean Water Revival Treatment Facilities. Each of these projects vary in their approach to reintroducing reclaimed water back into the environment utilizing a large range of natural and engineered treatment processes. Final water quality for each project varied slightly depending on end use and overall basin water quality goals and level of treatment and blending. It is clear that successful projects include a multi-faceted approach that employs current technology, an understanding of their system and goals, community involvement, and continued scientific research.

1.3 Next Steps – Background Development

The following next steps are recommended with regard to background development:

- Water quality monitoring of recycled water should continue on a semi-annual basis, allowing the District to remain ahead of public concern by monitoring for compounds of potential human and environmental risk.
- The District should remain involved with, or abreast of, research that investigates treatment technologies and their efficacy in decreasing select water quality parameters.

2.0 MARKET ASSESSMENTS

This section summarizes the results of the market assessments conducted for recycled water use in agriculture and large landscape irrigation, industry, and the environment. The goals of the assessment were to identify applications and technical requirements, document concerns and endorsements, and define a level of interest for the use of recycled water. The market assessments also helped to establish the market sector criteria, such as water quality, delivery pressures, and flow rates, for current and prospective users.

The methodology used for conducting these market assessments included: (1) focus group workshops, (2) telephone surveys, (3) review of industry literature, (4) consultation with industry experts, (5) review of water usage, and (6) comparison of current water supply quality to market criteria.

Detailed findings of the market assessments are presented in Technical Memorandum No. 2, Market Assessment, included as Appendix B.

2.1 Market Assessment Conclusions

Based on input from user groups for all four market sectors and a review of industry practices, areas of key concern for recycled water use are: (1) quality of recycled water supplies, (2) public perception, (3) costs, (4) consistent and reliable water pressure, and (5) reliability. Stakeholders consider water supply quality to be the most important.

Based on a detailed review of water quality thresholds unique to each market sector, it appears that recycled water use could be significantly expanded throughout the Santa Clara County. For many cases, tertiary-treated wastewater sources appear to conform to market-specific water quality criteria; however, for many other uses, advanced treatment for these supplies would be required.

Although technical requirements of some market segments can easily be met, it should be noted that public perception can often override all other market forces. For this reason, the District's approach of continual involvement and consultation with all stakeholder groups is of special importance and will be a vital component in achieving long-term goals for expanded recycled water use.

2.2 Summary of Agricultural Market Assessment

The use of recycled water for agricultural irrigation represents nearly half of the total statewide recycled water use. Although agricultural production may be on the decline in Santa Clara County, as it is incrementally converted to residential and recreational use, the County remains a significant producer of agricultural crops with acreage in active agricultural production concentrated in the southern end of the County.

Currently, the use of recycled water for agriculture is quite limited in the County (approximately 67 acre-feet per year (ac-ft/yr) or less than 1 percent of the total). However, this market represents a promising area for increased recycled water use and has the potential to reach 13,700 ac-ft/yr by 2020, or 32 percent of the potential demand[1]. The following summarizes the primary issues raised by agricultural users regarding recycled water use:

Water Quality

- Impact on crop yield, public health, soil, and groundwater.
- Constituents of primary concern: salinity, sodium, chloride, boron, residual chlorine, nitrogen, pH, heavy metals, and wastewater pathogens.
- Recognized that recycled water could provide valuable nutrients for their crops, but prefer to have the ability to add and regulate the levels of such nutrients rather than having to remove constituents that may be detrimental to crops.

Reliability/Pressurized Source of Supply

- Concerned that disruptions could occur in the delivery or quality levels of recycled water; prefer to have access to potable water as backup.
- Recycled water would be more attractive to use if it was provided at higher pressures, reducing their pumping costs.

Marketability of Crops

- Concerned about regulatory issues, acceptance from certification agencies, and labeling requirements.

Costs

- Cost of recycled water must be comparable to current costs of potable supplies.

2.3 Summary of Landscape Market Assessment

The use of recycled water for landscape irrigation represents nearly 20 percent of the total statewide recycled water use. Landscape users include golf courses, school yards, sports fields, college and business campuses, cemeteries, medians and parklands, as well as ornamental plant growers, flower, and turf farms. Much of the landscape irrigation market is located near urban centers, therefore situated near wastewater treatment plants and recycled water sources. For this reason this sector has become the largest user group in the County, representing 6,600 ac-ft/yr, or 90 percent of County-wide recycled water use. This sector is expected to remain the largest market segment, with the potential to reach 24,700 ac-ft/yr or 57 percent of projected 2020 County-wide use.[2]

[1] Presentation by Santa Clara Valley Water District at Commercial – Industrial Water Efficiency Technologies Workshop, November 22, 2002.
[2] Ibid

As noted above, this market sector actively irrigates with recycled water in populated areas; therefore, special focus should be placed on educational programs and assurance of public safety. The following summarizes the primary issues raised by landscape users regarding recycled water use:

Water Quality

- Similar criteria to agricultural uses, with sensitivity to salinity, but less susceptible to other chemical constituents.

Reliability/Pressurized Source of Supply

- Need for a reliable source of supply water supply, prefer to have access to potable water as backup.
- Similar need for pressurized supply as agricultural users, but these users rely on sprinkler systems with higher pressure requirements.

Marketability, Public Safety and Education

- Prefer educational programs as a means of increasing the public acceptability, such as those with non-profit and industry organizations.
- Concerned with public safety, particularly related to exposure of children to recycled water supplies.

Costs

- Must be comparable to current costs, accounting for any increased costs associated with converting irrigation systems to recycled water use and security measures that may be required for public safety.

2.4 Summary of Industrial Market Assessment

The use of recycled water for industrial purposes represents approximately 5 percent of statewide recycled water use. Recycled water at industrial facilities is typically used in cooling towers, boilers, and manufacturing processes, including high-tech, paper manufacturing, and carpet dying. The industrial market assessment focused on these three categories of recycled water use. As with landscape irrigation, much of the industrial sector is located near recycled water sources.

County-wide, approximately 650 ac-ft/yr, or 9 percent, of recycled water is currently being used in the industrial market. It is envisioned that this sector can expand to over 4,600 ac-ft/yr by 2020, or 11 percent of projected County-wide use.[3] One of the keys to expanding industrial use is the California Environmental Quality Act (CEQA). This Act requires many new industrial facilities, particularly power generation facilities, to utilize recycled water as a part of their environmental impact mitigation efforts. A good example of this is the Metcalf Energy Center, a new 600 megawatt power plant that will use over 3,000 ac-ft/yr of South Bay Water Recycling Program (SBWRP) supplies.

[3] Ibid.

The following summarizes the primary issues raised by industrial users regarding recycled water use:

Water Quality/Reliability

- Concerned about consistency of water quality due to the level of sensitivity of industrial processes to variations in water quality.
- Prefer to maintain the ability to use potable water in case of failure in the recycled water supply.

Costs

- Highly focused on cost. Since water quality can have a financial impact on industrial operations such as engineering costs, water treatment and disposal costs, cycles of concentration for cooling towers, wear on equipment and piping, as well as product quality.
- Interested in the development of guidelines for recycled water use that would provide users with engineering and process requirements, specifications, and associated costs.

2.5 Summary of Environmental Market Assessment

Environmental market assessment information gathered by the project team serves only as a supplement to the District's on-going efforts related to recycled water use in environmental enhancement applications. The focus of this effort was to highlight on-going District efforts related to environmental enhancement opportunities and present findings from user group input. As a part of the environmental market assessment effort, the project team:

- Participated in a focus group meeting of identified environmental users;
- Met with District staff involved with the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE); and
- Reviewed and prepared a summary of the Coyote Creek Streamflow Augmentation Pilot Project.

Environmental enhancement uses for recycled water have traditionally focused around wetlands enhancement and creation of wildlife refuge areas. The District's goals for implementing such enhancement programs are two-fold: to assist in increasing the availability of supplies for public drinking water, and the enhancement of natural habitat.

Currently, surface water from several District reservoirs is released to provide aquatic habitat in downstream waterways in compliance with regulations. If recycled water can be used to satisfy these streamflow requirements, additional surface water supplies would be made available to the public water supply.

From an environmental enhancement perspective, augmentation of current streamflows would significantly improve the habitats of aquatic fish and plant species within local waterways, such as Coyote Creek, Stevens Creek, Uvas Creek, Llagas Creek, and the Guadalupe River.

Furthermore, an increase in recycled water use for any application would result in an overall reduction of freshwater discharges (in the form of advanced treated wastewater effluent) to the benefit of sensitive species in the South Bay.

The ultimate outcome of this project, as it relates to this market sector, is to identify possible environmental enhancement opportunities, propose potential locations, consider associated facility needs, and determine water quality parameters and estimated demands for the use of recycled water in environmental enhancement applications. In addition, a summary of the Coyote Creek Streamflow Augmentation Pilot Project was prepared, as an example of a well-studied, potential enhancement program for the use of recycled water in the County's waterways.

2.6 Next Steps – Market Assessments

The market assessment conducted for this study provided an overview of user concerns and markets suitable for recycled water use. It was useful in developing project alternatives that would meet market needs particularly those related to water quality and user locations. Based on the detailed research presented in Technical Memorandum No. 2, the project team was able to tailor the treatment process to address the water quality requirements for the majority of the user base. However, as project alternatives are selected, more detail will be required to determine the specific locations of likely users and to develop a distribution system that will be effective in delivering the greatest quantity of recycled water to users. The user market will play an essential role in the selection of facility sites and the final sizing of plants. As such, direct contact will be necessary to ascertain the willingness of key users to convert to recycled water use and more detailed determination of water demands on a peak and average annual basis.

Also of key importance is determining how advanced treatment projects will be paid for and what portion of the costs will be passed on to users. As the District determines the cost sharing and external funding opportunities that exist, equal attention should be paid to the identification and analysis of:

- How much potential recycled water users currently pay for potable supplies.
- The potential added or reduced costs resulting from converting supplies to recycled water, such as irrigation retrofits, reduced fertilizer application levels or reduced pumping costs.
- Cost incentives that may be required in order for users to switch from potable supplies.
- Other water supply expenditures that would be avoided by increasing the use of recycled water in the County.

.

3.0 GROUNDWATER AND SURFACE WATER RESOURCES AND FACILITIES ASSESSMENT

This section summarizes the Groundwater and Surface Water Resources and Facilities Assessment (see Technical Memorandum No. 4 in the appendix). This assessment characterizes existing groundwater and surface water resources and facilities within the County and begins to evaluate the potential for water quality impacts and capacity issues associated with various uses of recycled water. This work builds upon the sampling and testing of existing raw water and recycled water supplies performed as part of this study, and upon recent regulatory developments and compliance issues in the State of California for both potable water and recycled water supplies.

The District has significant operating flexibility in how it can manage a variety of local and imported surface water supplies and groundwater subbasins. There appear to be a variety of opportunities for the expanded use of both tertiary treated wastewater and ARWT product water for large landscape and agricultural irrigation, industrial and environmental uses, and for indirect potable uses within the District's reservoirs and groundwater subbasins.

3.1 Groundwater Assessment

3.1.1 Constituents of Concern

The preliminary groundwater assessment identified four key parameters/groups or 'Contaminants of Concern.' These four parameters/groups were found to be, at times, at greater levels in recycled waters than in the County's groundwaters. They include Total Dissolved Solids (TDS), Nitrate, Total Organic Carbon (TOC), and several groups of Emerging Contaminants. Of these, TDS and one group of emerging contaminants, DBP [specifically, nitrosodimethylamine (NDMA) and haloacetic acids (HAA5)] are of moderate concern and appear to warrant further evaluation to understand their fate and transport in natural and engineered systems and to investigate the need for ARWT.

***Total Dissolved Solids*:** TDS from recycled and potable irrigation water will accumulate over time in the soil and may eventually migrate to groundwater. Although TDS is generally more of an aesthetic water quality issue at the current levels in the District's groundwater, if its level increases significantly, it may have adverse effects on soil permeability, vegetation and other uses such as industrial cooling.

***Nitrate*:** Nitrate in recycled water applied to land areas can pass through the soil and transported downward into groundwater over time. The amount of nitrate that reaches groundwater is typically smaller than the amount in the recycled water because of various attenuating factors including denitrification and subsequent volatilization of nitrogen gas and crop/plant uptake. Overall, the potential impact of nitrate on the ambient groundwater quality for various recycled water applications appears to be minor throughout the three subbasins.

***Total Organic Carbon*:** Ambient TOC levels in the County's groundwaters are typically very low (0.2 to 0.5 mg/l), and much lower than tertiary treated recycled water generated. Elevated

levels of TOC are of concern for two reasons: 1) TOC reacts with disinfectants during treatment to form regulated DBP, and 2) due to the nature of TOC, the majority (≥ 90 percent) of recycled water TOC is unidentified and the possibility exists that contaminants of health concern are encompassed in this parameter. There is ample scientific data stating that microbes in the subsurface rapidly degrade the majority of recycled water TOC and, therefore, TOC is not a significant water quality concern but one that is worth monitoring.

***NDMA*:** NDMA is a DBP and an industrial pollutant. Its fate and transport mechanisms are not well defined. An action level for drinking water of 10 ng/L (DHS, March 2002) has been established, and concentrations in tertiary recycled water sources in the County are an order of magnitude higher. NDMA, it appears, can be removed using high intensity ultraviolet light (UV) alone or in an advanced oxidation process such as the incorporation of hydrogen peroxide with UV. Industrial source control may be another option for NDMA reduction.

***DBP*:** HAA5 are a family of five DBP that have a collective drinking water MCL. When wastewaters are disinfected, HAA5 form at appreciable levels (10 to 200 µg/l). The fate and transport of these compounds in natural and engineered systems is not completely known. The eventual reuse of recycled water with elevated levels of HAA5 may be problematic and, therefore, these compounds should be monitored.

***Other Emerging Contaminants*:** To a lesser extent, Other Emerging Contaminants such as synthetic and naturally occurring hormones, industrial chemicals, and pharmaceutical compounds are of concern relative to their potential to impact groundwater quality. Additional monitoring as well as quantitative study, bench and pilot studies and demonstration projects appear warranted to determine how the unsaturated zones of each subbasin will attenuate these constituents.

***Contaminants of Concern Summary*:** If ARWT is required to mitigate the more significant concerns relative to TDS and NDMA, the advanced treatment processes will significantly reduce the levels of the other contaminants. It appears that addressing these two contaminants will help shape an ARWT project and long-term use throughout the County.

The vulnerability of each groundwater basin to potential water quality degradation was evaluated for various recycled water applications. The primary factors used in the evaluation were:

- The existing groundwater quality.
- The depth to groundwater and the capacity for contaminant attenuation in the subsurface.
- The presence of a clay aquitard separating the local aquifer into confined and unconfined zones.
- The potential end users above each subbasin.

The unconfined aquifer zone of the Coyote subbasin was identified as potentially most vulnerable to water quality degradation, followed by the unconfined zones of the Santa Clara Valley (SCV) and Llagas subbasins. The two identified as least sensitive to water quality degradation are the confined zones of the SCV and Llagas subbasins.

3.1.2 Agricultural and Large Landscape Irrigation Use

With respect to the use of disinfected tertiary recycled water for irrigation, the concern regarding the TDS and NDMA/HAA5 levels varies depending upon the local subbasin. In the SCV subbasin, almost all of the existing recycled water use is within the confined zone therefore, less concern is warranted. It appears prudent to conduct further quantitative assessments to understand the potential of attenuation and to review the results of ongoing research on the fate and transport of DBP, before irrigation use is significantly expanded into the Coyote subbasin and unconfined portions of the Llagas subbasin.

3.1.3 Groundwater Recharge Applications

Groundwater recharge appears to be worthy of additional study and pilot testing, and a demonstration scale project appears to be potentially feasible in the SCV and Llagas subbasins. Groundwater recharge could provide the most significant supply and reliability benefits of all uses to the District over the long-term, because the source of supply is essentially uninterrupted during droughts. It may also help solve wastewater management challenges in the North County and water quality issues in the South County.

***Surface Spreading*:** Groundwater recharge via surface spreading appears to have significant potential, considering the extensive network of recharge facilities that the District operates, particularly in the Los Gatos and Guadalupe recharge pond systems. Despite the considerable potential benefits of groundwater recharge, the public may not be ready to accept this use of recycled water. Therefore, it is important to first assess the level of public acceptability before pursuing this option any further. In addition, compliance with current draft DHS regulations would be extensive and would require a significant commitment by the District.

For surface spreading applications under the current draft DHS regulations, the contaminants that appear to have the greatest potential to significantly impact groundwater quality are the disinfection by-products NDMA and HAA5. The aforementioned need for further study and evaluation is required for this application.

***Direct Injection*:** For direct injection, the requirement for ARWT with 100 percent RO significantly reduces most contaminant levels. If 100 percent RO is coupled with UV in an advanced oxidation treatment process, direct injection would appear to have no negative impact to groundwater quality; it may even provide water quality benefits. There are several projects in southern California that have applied this method for recharge to mitigate seawater intrusion to drinking water aquifers.

3.1.4 Soil/Aquifer Plugging Potential

The potential for soil permeability and aquifer plugging problems from the use of recycled water were evaluated in terms of three primary mechanisms – biological, physical, and chemical plugging – at the soil surface, and in the underlying unsaturated, and saturated zones for various recycled water applications.

***Agricultural and Landscape Irrigation*:** It does not appear that any significant soil permeability or aquifer plugging problems will be created with the use of disinfected tertiary-treated recycled water in the soil surface and in the unsaturated zones of all three subbasins.

***Groundwater Recharge/Environmental Enhancement*:** Soil/aquifer plugging due to biological and physical mechanisms are not anticipated due to ARWT recharge water quality levels necessitated by regulatory requirements for these applications.

3.2 Surface Water Assessment

3.2.1 Potential Reservoir Augmentation Sites

Recycled water is being considered for augmenting surface water supplies (1) in reservoirs that currently supply source water to water treatment plants, and (2) in reservoirs that are used for releasing waters for downstream groundwater recharge.

Based on a preliminary review, it appears technically feasible to design reservoir augmentation for source water supply projects at Anderson, Calero, and Coyote Reservoirs. These reservoirs appear to meet current DHS requirements for augmentation with recycled water, and have adequate capacity, large watersheds, and/or imported supplies to develop this resource for use during a drought. Additional study would be required to determine the potential impacts of these projects from regulatory, operations, economic, and public acceptability standpoints.

As far as reservoir augmentation for eventual groundwater recharge, Guadalupe and Stevens Creek Reservoirs appear most attractive due to their proximity to recycled water sources and potential environmental benefits. Additional study would be required to assess the regulatory, operational, economic, and public acceptability issues associated with groundwater recharge reservoir augmentation at either of these sites.

3.3 Next Steps – Groundwater and Surface Water Assessments

If the District is to meet their stated recycled water use 2020 target, groundwater recharge will most likely play a key role in this effort. Groundwater recharge, whether by surface spreading or direct injection, will take a major commitment with respect to new treatment and distribution infrastructure, as well as public outreach. The following steps are recommended to be taken by the District in this regard:

- Remain current with on-going research projects on DBP and emerging contaminant fate and transport in the subsurface.
- Institute a County-wide salt migration and salt impact study.
- Assess impacts of current policy requiring equal or lower levels of individual water quality constituents in applied recycled water as compared to underlying groundwater, as this policy may cause excessive levels of advanced treatment.
- Maintain a dialog with regulators, such as responding with comments on the Draft DHS Groundwater Recharge Reuse Regulations.

4.0 STAKEHOLDER INVOLVEMENT PROCESS

4.1 Summary of Stakeholder Involvement Plan

As part of the ARWT Study, the District has implemented a comprehensive Stakeholder Involvement Plan. A detailed description of the Stakeholder Involvement Plan is presented in Technical Memorandum No. 3, included as Appendix D. The stakeholder groups and their specified roles are listed in Table 1.

Table 1 - ARWT Study Stakeholder Involvement Overview

Group	Composition	Role
Technical Advisory Group	Groundwater Management Unit, Integrated Water Resources Planning, City of San Jose, and FAHCE	Advised on study methodology and adequacy of technical work
District Advisory Committees	District representatives to agriculture and landscape community	Recommended people to be invited to focus groups and workshops; reviewed study results and made comments to Board
External Stakeholders	Large landscape irrigation, agricultural irrigation, industrial application, environmental, and other interests	Participated in focus groups and workshops to advise on potential uses, standards, and pilot projects

Development of the ARWT Stakeholder Involvement Plan began by identifying general study phases, pinpointing the questions to be addressed during each phase, and defining expected outputs from each phase. The approach to the Stakeholder Involvement Plan was built around these phases and is presented in Table 2. This table illustrates the roles of each stakeholder group and shows the linkage of these phases to the project tasks.

4.2 Implementation of Stakeholder Involvement

The following section summarizes the stakeholder involvement activities that occurred throughout the project. Specific dates of stakeholder involvement activities are presented in Table 3.

Table 2 - Project Phases and Stakeholder Involvement

Phase	Questions Addressed	Outputs	Associated Project Task(s)	Stakeholder Involvement
1. Consolidated and Evaluated Database	• What is the quality of current recycled water supplies? • How does this level of quality compare to existing drinking water sources? • What lessons can be learned from other advanced treatment recycled water projects? • What are the potential impacts on groundwater supplies for recycled water use? • Is there potential to blend recycled water with surface water supplies?	• A comprehensive and reliable technical database for making decisions.	• Task A - Background Development • Task D - Groundwater and Surface Water Resources and Facilities Assessment	• Technical Advisory Group - District Groundwater Unit provided input on groundwater resources and related efforts.
2. Identified Potential Markets and Standards	• What are the potential markets for recycled water? • What is the potential for each market? • What standards must be met to compete in each market?	• Clearly defined potential markets for recycled water including prospective demand levels, and required standards.	• Task B - Market Assessment • Task C - Stakeholder Participation	• External Stakeholders - Stakeholder workshops held to gather knowledge/insight from agricultural, large landscape and industrial users. • Technical Advisory Group - FAHCE provided input on environmental applications.
3. Identified Alternative Pilot Projects and Established Evaluation Criteria	• What type of advanced treatment would be required to meet market demands? • What kinds of pilot projects hold promise? • What are the key parameters for evaluation?	• A range of alternative pilot projects that could be used to test the markets. A basis for evaluation utilizing the data from previous phases.	• Task G.1 - Identify Water Quality Standards and Treatment Technology Alternatives • Task G.2 - Screen and Select Alternatives	• Technical Advisory Group - Various District advisors provided confirmation of evaluation criteria and projects to be selected for evaluation.
4. Evaluated Alternative Pilot Projects	• What are the permitting requirements and regulatory issues associated with these projects? • What are the economic considerations? • What environmental impacts would these projects have? • Which pilot project has the greatest potential? • Which pilot project is most feasible? • Which pilot project is most acceptable?	• An analysis of the feasibility of and the impacts associated with each pilot project.	• Task E - Regulatory Compliance; • Task F - Financial Analysis; • Task G.2 - Screen and Select Alternatives; and • Task H - Conduct Preliminary Environmental Analysis	• External Stakeholders - Reviewed potential projects and evaluation findings at workshop with representatives from all Interest Groups. • District Advisory Committees - Reviewed findings from technical evaluations and input gathered from external stakeholder workshop(s) to develop recommendations to present to Board of Directors. • Technical Advisory Group - Reviewed and advised on technical aspects (standards, criteria, and feasibility) of proposed alternatives. District Board members were invited and encouraged to participate and share expertise in these areas.
5. Developed Recommendation to District Board	• What pilot project should be recommended to the District Board? • How should this project be implemented?	• A recommended pilot project for consideration by the District Board.	• Task G.3 - Prepare Implementation Plan	• Board of Directors - Board of Directors review of project's recommendation(s). Board to consider adoption of recommended pilot project(s) for implementation.

Table 3 - Key Stakeholder Involvement Milestones	
Date	**Activity**
September 2001	Fact Sheet describing Study and overall Schedule of Activities
Initial Focus Group Workshops	
November 28, 2001	Large Landscape Focus Group Workshop
December 13, 2001	Agriculture Focus Group Workshop
January 31, 2002	Environmental Focus Group Workshop
February 26, 2002	Industrial Focus Group Workshop
June 17, 2002	Meeting with FAHCE component of Technical Advisory Group regarding environmental markets
Project Screening Workshops	
August 20, 2003	Demonstration Scale Projects – Technical Advisory Group Workshop
September 5, 2003	Combined External Stakeholders Workshop
January 26, 2004	Full Scale Projects – Technical Advisory Group Workshop

4.2.1 Initial Focus Group Workshops

The initial round of focus group workshops were conducted between November 2001 and February 2002. These workshops were held individually with representatives involved with large landscape irrigation, agriculture, industry, and environmental protection. These workshops allowed the District to present the project goals and gather input from stakeholders, including key concerns, questions, and priorities pertaining to recycled water use. Detailed input from these stakeholder meetings is presented in Appendix B – TM-2 Market Assessments and Appendix D – TM-3 Stakeholder Involvement Plan.

4.2.2 Demonstration Scale Project Screening Process

A thorough review of over twenty potential advanced treatment projects of varying scale and location was conducted by District staff and the consultant team. Following this review, three demonstration scale projects were selected for technical evaluation and further screening. As a part of this screening, a workshop was conducted with the Technical Advisory Group in August 2003. At this meeting, the group provided vital input in prioritizing projects and refining technical information.

4.2.3 Combined External Stakeholder Workshop

In September 2003, the three demonstration scale potential projects were presented to a gathering of representatives from all four focus groups. At this meeting, valuable input was gathered related to the three potential projects. Based on feedback from this workshop, the District made

the decision to conduct evaluations of several projects for full scale implementation. A discussion of the basis for this decision is presented in Section 5.

4.2.4 Full Scale Project Screening Process

After developing project descriptions for five full scale potential projects, the consultant team developed technical details and estimated project costs. This project information was presented to the Technical Advisory Group in January 2004 to gather feedback on the projects, including relative preferences and issues requiring further investigation.

4.3 Next Steps – Stakeholder Involvement

As discussed in Section 8, it is clear that additional solicitation of stakeholder input, both internal and external to the District, is required prior to proceeding with implementation of advanced treated recycled water projects in the County. The feedback received will allow the District to prioritize projects and select an approach to utilize advanced recycled water treatment in a manner that is coordinated with all District programs and initiatives and makes the best use of District resources now and in the future.

Aside from continued coordination with other District departments and initiatives involving other agencies, it is essential to the success of any recycled water project to implement a comprehensive public outreach program. These programs should be part of the project planning and should provide information to the public and solicit feedback at all key project milestones.

5.0 SELECTION OF POTENTIAL PROJECTS

This section provides a summary of the process employed in the selection of potential projects, both demonstration scale and full scale, and presents a brief description of the components and issues associated with each project that was evaluated as a part of this study. A detailed description of the evaluation process is presented in Section 8.

5.1 Development of Potential Projects

Following the completion of background research, including the sampling program, market assessments, groundwater and surface water assessments, and initial stakeholder workshops, the project team conducted a brainstorming session at which over twenty potential projects were presented and evaluated. Potential projects were developed individually by the consultant team and by District staff and were comprised of paper studies, bench scale projects, pilot studies, and demonstration scale projects.

Following discussion and voting by all attendees, three projects were selected for further evaluation. The selected projects were all demonstration scale and located throughout the County in Coyote Valley, San Martin, and Gilroy. Demonstration scale projects were selected in lieu of research, bench or pilot scale projects primarily since the District expressed an interest in proceeding beyond research and into actual implementation of advanced treatment technology. The project team agreed that a significant amount of research and small-scale testing had been performed by other agencies and could be built upon in a larger, demonstration scale project. For the subsequent evaluation, a uniform project capacity of 1 MGD was chosen to facilitate a direct comparison between the projects.

5.2 Demonstration Scale Projects

For each of the demonstration scale projects, a detailed evaluation was conducted to develop a treatment process optimally suited for the specific supply source(s) and for the projected users. Additionally, a regulatory review and financial analysis was conducted, as presented in Appendix E – Technical Memorandum No. 5 and Appendix F – Technical Memorandum No. 6.

A brief outline of the three demonstration scale potential projects is presented in Table 4. Also presented in this table are the key findings related to these demonstration scale projects that resulted from meetings with the Water Use Efficiency Unit and the Technical Advisory Group, as well as the September 2003 External Stakeholder Workshop.

As a result of the feedback received at the District review meetings and the combined stakeholder workshop, District staff concluded that each of the three projects were worthy of further study and none were eliminated from further consideration. However, the next step of the study was to conduct evaluations of several projects on a full scale basis, primarily as a result of the input received on Alternatives 1 and 2 which no longer needed to be limited to demonstration scale projects, as noted above.

Table 4 - Demonstration Scale Project Summary			
	Users	**ARWT Process**	**Findings**
Alt 1 – Coyote Narrows	Large-landscape & agricultural irrigation activities in the Coyote Valley	Microfiltration membrane (MF) pretreatment, 100% reverse osmosis membrane filtration (RO), high intensity UV for organics destruction, residual disinfectant, possible pH adjustment *Source water:* SJ/SC WPCP via Silver Creek Pipeline	• Project would improve public support if the District committed to utilizing 100% RO treatment and incorporated a streamflow augmentation component. • Questioned the need to limit the project to demonstration scale, since the high level of advanced treatment was expected to address most key concerns of District staff and general public.
Alt 2 – SCRWA	Agricultural users, with research benefits on crop health & soil impact	MF pretreatment, 70% RO *Source water:* SCRWA	• As with Alternative 1, there is some question as to the value of a demonstration scale approach because this alternative would essentially treat water that is currently being used for irrigation to even higher levels of quality.
Alt 3 – San Martin	Agricultural or urban landscape irrigation uses in the San Martin area affected by groundwater contamination	Blended water from satellite sewage scalping & Perchlorate removal process *Source water:* 50% Local Sewer, 50% Perchlorate contaminated groundwater	• Project well-received by the public, because it addresses some of the water supply challenges resulting from the Perchlorate plume. • Concern expressed as to whether this project was in fact furthering the study of advanced recycled water treatment, as it includes only tertiary treated wastewater. • Concern was also expressed that this project would have limited expandability due to the low sewer flows available and the short-term nature of the Perchlorate issue.

The District determined that five full scale projects should under go a similar level of technical evaluation, prior to selecting a final project for implementation. Projects of this size are anticipated to bring the District closer to its target levels for County-wide recycled water use and to greatly reduce the project costs per unit of treatment based on economies of scale. The San Martin project was not selected for full scale study; however, a project located at the SJ/SC WPCP was added in order to consider advanced treatment of all supplies produced by SBWR and to allow for easy discharge of brine to San Francisco Bay.

5.3 Full Scale Potential Projects

Table 5 presents brief outlines of the five full scale projects evaluated in this phase of the study. More detailed technical, regulatory, and cost information is presented in Appendices E and F.

Table 5 - Full-Scale Project Summary

	Users	ARWT Process	Brine Handling	Other
Alt 1A – 20 MGD ARWT Plant at SJ/SC WPCP	10 MGD for existing SBWRP users, 10 MGD for future potential users in the north & Coyote Valley, including the Metcalf Energy Center (MEC).	MF pretreatment, 100% RO, high intensity UV for organics destruction, residual disinfectant, possible pH adjustment *Source water:* SBWR	MF reject stream returned to the head of the SJ/SC WPCP. RO brine blended with plant effluent flowing to SF Bay.	• MEC will be able to more efficiently use high quality water provided by ARWT for cooling water. Project will consider the avoided costs such as less on-site treatment, reduced water purchases & disposal.
Alt 1B – 45 MGD ARWT Plant at SJ/SC WPCP	Same as Alt 1A, plus 25 MGD for future potential groundwater recharge & streamflow uses.	Same as Alt 1A. *Source water:* SBWR	Same as Alt 1A.	• Same MEC avoided costs as Alt 1A.
Alt 2 – 15 MGD ARWT Plant near MEC	5 MGD to the MEC, & approximately 10 MGD to future potential users in the Coyote Valley, including irrigation & steamflow uses.	Same as Alt 1A & 1B. *Source water:* SBWR via Silver Creek Pipeline.	MF reject stream & the RO brine will be combined & further concentrated by a brine recovery RO system (BRRO) prior to storage then discharge to a local sewer main leading to the SJ/SC WPCP.	• Same MEC avoided costs as Alt 1A & 1B. • Project will also include a small-scale RO plant at SJ/SC WPCP to mitigate impacts of brine conveyed by local sewer.
Alt 3 – 11 MGD ARWT Plant at SCRWA WPCP	11 MGD for irrigation, industrial, & streamflow/wetlands uses in the Gilroy area.	MF pretreatment & RO with approximately 40% bypass to lower TDS to meet levels in the local groundwater. *Source water:* SCRWA.	MF reject stream returned to the head of the SCRWA WPCP. Brine generated by RO discharged to lined evaporation ponds located at the site.	• Considers avoided cost of constructing 8 MGD tertiary facility if the MF pretreatment can eliminate the need for additional tertiary treatment.
Alt 4 – 11 MGD ARWT Plant at SCRWA & 25 MGD ARWT Plant at SJ/SC WPCP	11 MGD for irrigation, industrial, & streamflow/wetlands uses in the Gilroy area & 25 MGD for long-term irrigation & other uses in Morgan Hill & Gilroy.	MF pretreatment & RO with bypass (percentage to be determined). *Source water:* SBWR via new pipeline & SCRWA.	Brine at SJ/SC WPCP handled the same as Alt 1A & 1B. Brine at SCRWA handled the same as Alt 3.	• Project requires construction of new pipeline from San Jose area to Gilroy.

6.0 REGULATORY REVIEW AND INTEGRATED PERMITTING STRATEGY PLAN

This section summarizes the regulatory review conducted for the demonstration scale and full scale potential projects and presents a summary of the permitting strategies developed for the implementation of each alternative. Detailed findings of the regulatory review and permitting strategy developments are presented in Technical Memorandum No. 5, Regulatory Review and Integrated Permitting Strategy Plan, included as Appendix E.

As a part of the regulatory review, the project team conducted a review of applicable regulations including the California Health and Safety Code, the California Water Code, Title 17 and Title 22. Due to the continuing changes in regulations, particularly related to groundwater recharge, the team conducted a review of anticipated changes in Title 22 requirements.

Following this review, the consultant team discussed the potential projects with representatives from the following agencies:

- California Department of Health Services (DHS)
- State Department of Environmental Protection
- San Francisco Bay Regional Water Quality Control Board (RWQCB)
- Central Coast Regional Water Quality Control Board
- Santa Clara County Department of Environmental Health
- SBWRP
- City of Gilroy/SCRWA

Based on this research, the primary permitting requirements potentially associated the potential projects are:

- Water Reuse Permits – issued by the RWQCB with DHS review and approval.
- California Environmental Quality Act (CEQA) Compliance – California Public Resources Code, Section 21000 *et seq.*

A summary of the regulatory and permitting requirements for the potential projects is shown on Table 6.

Table 6 - Regulatory and Permitting Summary

	Demonstration Scale Alternatives			Full Scale Alternatives				
	1	2	3	1A	1B	2	3	4
Water Reuse Permit	SF Bay RWQCB General Permit – limited documentation due to previously permitted water source for proposed uses	Central Coast RWQCB Master Reclamation Permit– limited documentation due to previously permitted water sources for proposed uses	Central Coast RWQCB Master Reclamation Permit – thorough documentation required on new treatment process	SF Bay RWQCB General Permit – limited documentation due to previously permitted water source for proposed uses	SF Bay RWQCB and DHS will require compliance with Groundwater Recharge Reuse Project regulations	SF Bay RWQCB, New Water Reuse Permit to address streamflow uses	Central Coast RWQCB Master Reclamation Permit– documentation required to address streamflow/ wetlands uses	SF Bay and Central Coast RWQCB Permits – similar to Full-Scale Alt 2 and 3
CEQA Compliance	Initial Study/ Mitigated Negative Declaration (IS/MND)	IS/MND	IS/MND, potential for EIR related to sewage scalping plant impacts	IS/MND, project located on developed industrial site	Focused EIR to address recharge uses	Focused EIR to address streamflow uses and potential for facility impacts on residential areas	Focused EIR to address streamflow/ wetlands uses	Focused EIR to address streamflow/ wetlands uses and potential impacts on transmission pipeline construction
Other Permits/ Issues	No other significant permits have been identified	No other significant permits have been identified	No other significant permits have been identified	Modifications to SF Bay discharge permit – due to elevated copper and nickel levels in brine	SF Bay Discharge Permit modifications. Significant level of public outreach will be required for recharge uses	Modifications to SF Bay discharge permit	No other significant permits have been identified	Modifications to SF Bay discharge permit

6.1 Next Steps - Regulatory Review and Permitting

The above regulatory review and permitting strategy is preliminary in nature and is limited by the level of detailed information available for each project alternative. It is recommended that as projects are selected for implementation, follow-up reviews are conducted based on more defined project components. The next stage of this review process should include:

- More specific conversations with regulatory agencies, particularly the RWQCB (Central Coast and San Francisco Bay) and DHS, regarding the level of engineering documentation and the specifics of the review process.
- Additional research into the potential impacts on the SJ/SC WPCP discharge permit as it relates to increased metal loadings from brine streams.
- Further studies of streamflow augmentation and the regulatory and environmental impacts associated with these releases, beyond the previous studies that have been conducted on the Coyote Creek.
- Detailed siting evaluations for project facilities to determine potential environmental impacts on surrounding areas, particularly related to Full Scale Alternative 2 which cannot be located with the MEC site and may require siting in residential or undeveloped settings.

7.0 FINANCIAL ANALYSIS

This section summarizes the review of funding opportunities and the financial evaluation for project alternatives. Detailed information on project finding and financial analysis are presented in Technical Memorandum No. 6, Financial Analysis, included as Appendix F.

7.1 Funding Opportunities

Recycled water projects can be funded by a variety of different options. In addition to conventional funding, such as revenue bonds and certificates of participation, the District may have the opportunity to obtain funding from federal, state and local sources in the form of grants and/or loans. The potential external funding sources evaluated include:

- California State Water Resources Control Board: 319 NPS Implementation Program; Proposition 50; Water Recycling Facilities Planning Grant Program
- CALFED - Proposition 40 State Funding: Wildlife Conservation; Protection of Water Ways; Conservancies
- State Revolving Fund Loans
- Department of Water Resources
- Bureau of Reclamation
- California Infrastructure Economic Development Bank

In addition to external funding sources, the funding evaluation reviewed several sources of conventional funding including: General Obligation Bonds; Revenue Bonds; Certificates of Participation; Capital Reserves; Pay-As-You-Use Funding.

Other funding sources to be considered include partnerships with other agencies and institution of fees for developers whose project in part necessitate the need for new water supplies.

7.1.1 Summary of Funding Opportunities

Based on the team's review of funding sources, a preliminary ranking of each project alternative was developed to represent the relative likelihood of qualifying for each external funding source described above. Table 7 summarizes the ranking of various funding agencies to fund the three demonstration project alternatives and the five full scale project alternatives.

Table 7 - Summary of Funding Opportunities for Each Alternative	
Funding Source	**Ranking**
State Water Resources Control Board (SWRCB) 319 NPS	2
SWRCB Proposition 50	3
State Proposition 40[a]	2
State Revolving Fund (SRF) Loans	3
Department of Water Resources (DWR) Proposition 82	1
DWR Chapter 6	3
Bureau of Reclamation	2
California Infrastructure Economic Development Bank (CIEDB)	1
Conventional	3
[a] State Proposition 40 would not be applicable for Demonstration Project Alternative 3. Ranking Scale: 0 (Not Applicable); 1 (Least Likely); 2 (Likely); 3 (Most Likely).	

Based on this evaluation, the most likely source of funding will be through Proposition 50, SRF loans, DWR Chapter 6, and conventional funding such as bonds and capital reserves.

The above ranking excludes factors such as the amount of funding required, availability of grants or low-interest loans, and methods for paying off debt in an equitable manner all of which should be considered in determining the most feasible funding mechanism. Detailed investigations of these funding sources should be conducted to determine the feasibility and availability of funding because the requirements and availability continue to change. It is important to note that grants typically provide only partial funding and low interest loans and other funding should be used for the remaining costs.

Additional funding opportunities may exist related to research/demonstration components of these projects such as American Water Works Research Foundation, Water Environment Research Foundation, and WateReuse Foundation, and should be explored in greater detail for the selected project.

7.2 Financial Analysis

Conceptual cost estimates and financial evaluations were developed for each project alternative based on the following assumptions:

1. Process equipment and building costs estimated by comparison with at least three projects in the past several years, adjusted to 2003 dollars.

2. Contingency based on the conceptual level of design: 25 percent

3. Engineering and Administration (Design, Environmental, Construction Administration): 25 percent

4. Land Acquisition (assumes siting on District, City of San Jose, or SCRWA land): Excluded

5. Operations and Maintenance Costs
   - Power, chemical, spare parts, other utilities: Included
   - District staffing costs: Excluded

6. Planning Period: 20 Years
7. Interest Rate: 5 percent

Based on these assumptions, a conceptual cost was developed and annual operations and maintenance expenditures were estimated, as shown in Table 8.

Table 8 - Cost Comparison of Alternatives

Alternative	Initial Capital Cost*	Annual O&M Cost	Present Worth Cost**
Demonstration Project Alternative 1	$20,878,000	$296,000	$24,567,000
Demonstration Project Alternative 2	$14,760,000	$184,000	$17,048,000
Demonstration Project Alternative 3	$21,761,000	$161,000	$23,768,000
Full Scale Alternative 1.A	$81,658,000	$3,904,000	$130,314,000
Full Scale Alternative 1.B	$216,328,000	$12,490,000	$371,976,000
Full Scale Alternative 2	$82,766,000	$4,491,000	$138,731,000
Full Scale Alternative 3	$68,481,000	$2,255,000	$96,583,000
Full Scale Alternative 4	$406,537,000	$8,760,000	$515,702,000

* Includes 25% contingency and 25% for CEQA, Planning, Engineering, and Construction Management.
**20-year planning period at 5% interest rate.

7.3 Next Steps - Financial Analysis

As projects are selected for implementation and become more defined, further research will be required to ascertain the most applicable funding sources. Successful identification of outside

funding sources will be a determining factor in whether advanced treatment projects are approved for implementation. This is due to the high cost of construction and the challenges of convincing users to pay for recycled water at rates required to fund the project. Federal, state, partnerships or developer-based funding sources must be identified early on because most application processes take years and developer fees are not paid until homes are constructed. It is recommended that the project team monitor current funding programs and maintain contact with funding agencies to tailor projects as much as possible to maximize the funding potential.

The financial analysis summarized above and included in detail in Appendix F is based on conceptual project designs and rule of thumb costs for construction and operation. As project details are developed more precise estimating will become possible. The portions of the estimates that are least defined at this point are the following:

- ***Land Acquisition*** - This component has been excluded due to the limited information available on project siting. These costs, however, may be significant, especially related to siting Full Scale Alternative 2 near the MEC in the Coyote Valley and the need for over 90 acres of evaporation ponds within or near the SCRWA plant.
- ***Distribution Costs*** - These costs have been roughly developed by District staff to represent order of magnitude costs for transmission and distribution of recycled water. As project sites and locations of key users are defined, distribution networks will go through planning and conceptual design stages; following this work, more precise costs will need to be developed.
- ***Avoided Costs*** - Though preliminary discussions with Calpine and SCRWA indicate that these entities could benefit and reduce their costs with ARWT projects the precise amounts that would be reimbursed to the District have not been determined. In addition, the timing of ARWT implementation is essential in capitalizing on these cost savings, particularly at SCRWA where expansion of their tertiary facilities is currently being designed for near term construction.
- ***ARWT Plant Operation*** - Though the O&M costs shown in Table 8 include a preliminary estimate of operating costs, such as power, chemicals and spare parts, the labor required for operating and maintaining the facilities has not yet been estimated. This O&M effort will likely be borne by District staff or through arrangements with the City of San Jose or SCRWA. These relationships will be challenging to finalize and may represent a significant cost to the project.

8.0 EVALUATION OF POTENTIAL PROJECTS

This section presents an overview of the process used in evaluating the demonstration scale and full scale project alternatives. As indicated in Section 5, input has been solicited throughout the project from within the District from external stakeholders to evaluate potential projects and develop recommendations. The evaluation and recommendations summarized in this section are based on a synthesis of stakeholder input with detailed discussion among the core project team members on the consultant team and within the District's Water Use Efficiency Unit.

8.1 Demonstration Scale Projects

As indicated in Section 5, three potential projects were evaluated in the demonstration scale category:

- Alternative 1 – Coyote Narrows Advanced Treated Recycled Water Project
- Alternative 2 – SCRWA Area Advanced Treated Recycled Water Project
- Alternative 3 – San Martin Area Advanced Treated Recycled Water Project

Table 9 presents an overview of the evaluation of these three potential projects relative to nine criteria that were established based on input from all project stakeholder groups:

8.1.1 Demonstration Scale Projects – Findings

As noted in Section 5, this information was presented to the Water Use Efficiency Group and the Technical Advisory Group in August 2003. Following the September 5, 2003 External Stakeholder Workshop, it was agreed that all three demonstration scale projects were feasible and worthy of further consideration. However, based on stakeholder feedback, it was agreed the focus of the study would shift to full scale projects for the following reasons:

- Demonstration scale projects as defined under Alternatives 1 and 2 may not merit being studied on a demonstration scale since the projects treat current recycled water supplies to even higher levels of water quality and therefore would not likely require demonstration efforts to address concerns within the District or general public.
- Assuming demonstration is not required, full scale projects would bring the District closer to target levels for County-wide recycled water use.
- Full scale projects are more cost effective on a per MGD basis, greatly reducing the project costs per unit of treatment based on economies of scale.

In addition, it was agreed that Alternative 3 would not be evaluated at full scale and may not merit further consideration at a demonstration scale for the following reasons:

- This alternative did not specifically involve the study of advanced recycled water treatment, only tertiary treated wastewater.
- This project would have limited expandability due to the low sewer flows available and the short-term nature of the perchlorate issue.

Table 9 - Demonstration Scale Project Evaluation

Criteria	Alternative 1 – Coyote Narrows	Alternative 2 – SCRWA	Alternative 3 – San Martin
Understanding of Groundwater Protection	**Ideal Location in Santa Clara County** • Shallow depth to groundwater and highest quality groundwater • Changes in aquifer will be most perceptible • Multiple uses allow for comparisons • Potential insight into aquifer recharge	**Fair Location to Monitor Groundwater Quality** • Groundwater at greater depth and lesser quality than Coyote Narrows • Impacts due to Agricultural use • Turf irrigation at golf course	**Fair Location to Monitor Groundwater Quality** • Groundwater at greater depth and lesser quality than Coyote Narrows • Impacts due to Agricultural use • Turf irrigation at golf course
Building Public Understanding/Acceptance of Various Uses	**Good Potential for Building Understanding** • If it does not adversely impact groundwater in Coyote Valley, unlikely to harm it elsewhere • New uses (streamflow) will be considered	**Good Potential for Building Understanding** • Will demonstrate to farmers that recycled water is usable for most crop species • New uses (streamflow) will be considered	**Limited Potential for Building Understanding** • Advanced treatment will not be used • No new uses will be demonstrated
Public Acceptance/ Opposition of Demonstration Project	**No Significant Issues with Current Uses** • Existing Uses – Improved Quality • Potential acceptance issues with Coyote Creek augmentation	**No Significant Issues with Current Uses** • Existing Uses – Improved Quality • Potential acceptance issues with Llagas Creek augmentation	**Some Potentially Significant Public Perception Issues** • NIMBY Issues with Satellite Plant • New Recycled Water Use • Develops Solution to Perchlorate Issue
Environmental Enhancement Opportunities (above and beyond CEQA)	**Potential Enhancement Opportunities** • Coyote Creek Augmentation (1st Tier Priority) • Coyote Creek was focus of Collaborative Effort and previous study	**Potential Enhancement Opportunities** • Llagas/Uvas Creek Augmentation (2nd Tier Priority) • Wetland for Pajaro River Discharge	**Potential Enhancement Opportunities** • Remediation of contaminated groundwater • No streamflow or other environmental uses of recycled water
Relative Cost / Funding Opportunities	Funding Opportunities – equivalent to other alternatives Initial Capital Cost = $12.9M Annual O&M Cost = $0.26M **20-Year Present Worth Cost = $16.1M**	Funding Opportunities – equivalent to other alternatives Initial Capital Cost = $9.6M Annual O&M Cost = $0.16M **20-Year Present Worth Cost = $11.5M**	Funding Opportunities – equivalent to other alternatives Initial Capital Cost = $17.7M Annual O&M Cost = $0.14M **20-Year Present Worth Cost = $19.5M**
Institutional Simplicity vs. Complexity and Partnering Opportunities	**Some Potential Institutional Issues** • MEC – land acquisition, power supply • SBWR – may raise WQ concerns with SBWR customers • Great Oaks – may be seen as reducing customer base • Partner with MEC, SBWR	**Few Potential Institutional Issues** • SCRWA – land acquisition, coordination with Obata and other existing SCRWA recycled water customers (Eagle Ridge GC) • Partner with SCRWA, Agricultural Organizations	**Some Potential Institutional Issues** • City of Morgan Hill Public Works – sewage supply and water supply issues • SCRWA – reduction in influent • Partner with City of Morgan Hill, Process equipment vendors
Relative Quantity of Water Supply Produced	**Multiple Uses, Substantial Demand** • Multiple uses near the proposed site – growth envisioned in large landscape (suburban development, office campus) • Future potential for stream flow augmentation and industrial (100% RO) • Near-term recycled water supply from Silver Creek Pipeline (5-10 MGD available to SCVWD)	**Multiple Uses, Substantial Demand** • Potentially significant agricultural demand • Potential change in supply to Eagle Ridge • Future potential for stream flow augmentation and industrial (70% RO) • Near-term recycled water supply 9 MGD (following SCRWA Expansion)	**Limited Expansion Potential** • Significant agricultural and turf demand • Short-term need for groundwater remediation • Recycled water supplies limited by local sewer flow
Implementation Schedule – Lengthy vs. short duration	Pre-Design, CEQA, Permitting – 7.5 months Detailed Design and Construction – 16 months **Total Duration = 23.5 months**	Pre-Design, CEQA, Permitting – 12.5 months Detailed Design and Construction – 16 months **Total Duration = 28.5 months**	Pre-Design, CEQA, Permitting – 15.5 months Detailed Design and Construction – 16 months **Total Duration = 31.5 months**
Relative Regulatory Complexity	**Low Complexity** • Mitigated Neg Dec • Covered under SFRWQCB General Water Reuse Permit • Uses already permitted Title 22 sources	**Intermediate Complexity** • Mitigated Neg Dec • File new Master Reclamation Permit with Central Coast RWQCB • Uses already permitted Title 22 sources	**High Complexity** • May require Focused EIR • File new Master Reclamation Permit with Central Coast RWQCB • Requires permitting of new Title 22 supply and waste discharge permit for irrigation with water with low levels of perchlorate contamination

As a result of this feedback, it was agreed that Alternatives 1 and 2 would be evaluated further at full scale, and additional projects with potential for full scale implementation would be considered. It was also agreed that as further evaluation is completed on full scale projects and decisions are developed on an implementation program, demonstration scale projects, such as the three listed alternatives, would be remain an option for further consideration.

8.2 Full Scale Projects

Following the above decisions related to demonstration scale projects, the five full scale project alternatives were selected for evaluation by the project team. As a part of this evaluation process, the consultant team developed technical descriptions of the alternatives, estimated life cycle costs, and conducted an evaluation of these alternatives relative to the project criteria. Based on this research and on input received at workshops with the Water Use Efficiency Unit and the Technical Advisory Group in January 2004, an evaluation overview of alternatives was prepared, as shown on Table 10.

As a part of the evaluation of these alternatives for quantity of water produced, a key parameter was the "Efficiency" of each project. For the sake of this evaluation, efficiency is defined as the ratio of anticipated annual recycled water production to the total peak capacity of the ARWT facility. This parameter indicates the percentage of maximum plant output actually utilized by the facility to meet user needs. For example, projects that rely extensively on summertime irrigation but have low winter usage will have low efficiencies. Conversely, projects that have a steady demand throughout the year to meet industrial streamflow or other uses would have high efficiencies. This parameter gauges the value of the investment as it predicts the District's return on recycled water sales per dollar spent on construction.

This investment evaluation approach is further explored in this part of the table which lists the portion of plant production that is expected to supply new recycled water users as "New Water Use." Since the District goal is to increase recycled water use beyond current levels, it is important to differentiate between existing customers and new markets that are opened as a result of advanced treatment. For this evaluation, existing users are considered to be current SBWR, SCRWD, and MEC customers.

Furthermore, as shown in the Relative Cost portion of this overview table, the evaluation reviewed the "Unit Cost per AF Produced." The parameter allowed the team to assess the actual cost per acre foot of water to be produced. The unit cost is comprised of the amortized cost (annual debt service) of the initial investment, plus the annual operation and maintenance costs of the project, divided by the total annual production expected at the plant. This unit represents the cost to the District for producing the water and is useful for comparison to other water supply approaches that the District is considering.

8.2.1 Full Scale Projects – Findings

Based on this evaluation and feedback from Technical Advisory Group participants, the project team developed several preliminary conclusions relative to the five full scale alternatives.

Full Scale Alternative 1A - 20 MGD ARWT Plant at the SJ/SC WPCP

- This project would set a precedent for full RO and UV treatment for all uses and groundwater subbasins and might commit the District to providing this level of treatment where it is not necessarily warranted for user needs or protection of specific groundwater subbasins.
- This project does not provide information on new uses of recycled water because it supplies only industrial and irrigation users.
- This project would be limited in its expansion potential, due to the limited growth expected in the North County; for expansion, this project would need to tap into groundwater recharge, as with Alternative 1B.

Full Scale Alternative 1B - 45 MGD ARWT Plant at the SJ/SC WPCP

- Public acceptance of recharge would be a challenge for this project and would require significant outreach effort because there is no precedent in northern California for groundwater recharge.
- Though this project would significantly increase recycled water use, this project has a high cost of construction and operation and may be more suitable as a long-term option.

Full Scale Alternative 2 - 15 MGD ARWT Plant near the Metcalf Energy Center

- This project would increase public acceptance and understanding of groundwater protection for irrigation and streamflow uses in the Coyote Valley, an area of expected population growth.
- This project does not set a precedent for the District to use full RO/UV treatment for all uses, and focuses high levels of treatment in areas where underlying groundwater is most vulnerable.
- This project has more favorable average annual production efficiency and relatively low cost, making it an appropriate candidate as a near-term alternative.

Table 10 - Full Scale Project Evaluation

Criteria	Alternative 1A	Alternative 1B	Alternative 2	Alternative 3	Alternative 4
Understanding of Groundwater Protection	• Uses 100% RO/UV • No streamflow/recharge • Provides valuable info from Coyote Valley irrigation	• Uses 100% RO/UV • Heavy recharge could impact quality • Provides valuable info from recharge and CV irrigation	• Uses 100% RO/UV • Provides valuable info from CV irrigation and streamflow	• Uses 40% RO/ No UV • Less sensitive Llagas Subbasin • Provides valuable info from streamflow/wetlands	• Uses 30% RO/ No UV • Less sensitive Llagas Subbasin – Heavy irrigation • Provides valuable info from streamflow/wetlands
Building Public Understanding/Acceptance of Various Uses	• Demonstrates commitment to full RO/UV for all uses (also sets precedent) • No new uses demonstrated • Improved WQ for existing uses	• Builds understanding of groundwater recharge and streamflow • Public acceptance of recharge will be major challenge	• Improved WQ for existing uses • Increases public understanding from CV irrigation and streamflow	• Improved WQ for existing uses • Increases public understanding of streamflow/wetlands uses	• Improved WQ for existing uses • Increases public understanding of streamflow/wetlands uses
Public Acceptance/Opposition of Demonstration Project	• Demonstrates commitment to full RO/UV for all uses • Improved WQ for existing uses – acceptance likely	• Builds understanding of recharge – greatest challenge & benefit • Public acceptance will require major outreach effort	• Improved WQ for existing uses- acceptance likely • Inequity with SBWR water quality may be issue • 100% RO will help with Great Oaks acceptance • Public outreach required for streamflow uses	• Improved WQ for existing uses- acceptance likely • Public outreach required for streamflow/wetlands uses	• Public concern with costs likely • Public outreach required for streamflow/wetlands use
Environmental Enhancement Opportunities (above and beyond CEQA)	• Increases salinity of SF Bay Effluent	• Streamflow augmentation • Increases salinity of SF Bay Effluent • Maybe perceived as groundwater degradation	• Streamflow augmentation • Increases salinity of SF Bay Effluent	• Streamflow Augmentation • Wetlands creation	• Streamflow Augmentation • Wetlands creation
Relative Cost / Funding Opportunities	• Initial Cost: $81.7M • 20-Yr Present Worth $130.3M • Unit Cost per AF Produced: $807	• Initial Cost: $216.3M • 20-Yr Present Worth $372.0M • Unit Cost per AF Produced: $844	• Initial Cost: $82.7M • 20-Yr Present Worth $138.7M • Unit Cost per AF Produced: $1,153	• Initial Cost: $68.5M • 20-Yr Present Worth $96.6M • Unit Cost per AF Produced: $988	• Initial Cost: $406.5M • 20-Yr Present Worth $515.7M • Unit Cost per AF Produced: $1,996
Institutional Simplicity vs. Complexity and Partnering Opportunities	• SJ and SBWR – site, O&M, water quality, cost sharing • MEC – avoided costs, water quality • Great Oaks – groundwater quality	• SJ and SBWR – site, O&M, water quality, cost sharing • MEC – avoided costs, water quality • Great Oaks other affected water retailers– groundwater quality	• SJ and SBWR – site, O&M, water quality, cost sharing • MEC – avoided costs, water quality • Great Oaks other affected water retailers– groundwater quality	• SCRWA – site, O&M, water quality, avoided costs • Simplest	• SCRWA – site, O&M, water quality, avoided costs • SJ and SBWR – site, O&M • Agency coordination – pipeline ROW
Relative Quantity of Water Supply Produced	• Capacity: 20 MGD • Average Annual Production: 12,950 AC-FT/YR (11.6 MGD) • Efficiency: 58% • New Water Use: 3,100 AC-FT/YR • Mix of industrial and irrigation – limited No. County growth	• Capacity: 45 MGD • Average Annual Production: 33,500 AC-FT/YR (30 MGD) • Efficiency: 67% • New Water Use: 25,500 AC-FT/YR • Could open recharge use County-wide	• Capacity: 15 MGD • Average Annual Production: 9,600 AC-FT/YR (8.6 MGD) • Efficiency: 57% • New Water Use: 6,800 AC-FT/YR • Could open streamflow use, limited CV growth	• Capacity: 11 MGD • Average Annual Production: 7,840 AC-FT/YR (7 MGD) • Efficiency: 64% • New Water Use: 7,350 AC-FT/YR • Could open streamflow use – So. County supply limited	• Capacity: 34 MGD • Average Annual Production: 20,720 AC-FT/YR (18.5 MGD) • Efficiency: 54% • New Water Use: 20,230 AC-FT/YR • Could open streamflow use - Overcomes So. County supply limit
Implementation Schedule – lengthy vs. short duration	• Pre-Design, IS/MND, Permitting – 12 months • Detailed Design and Construction – 20 months • Total Duration = 32 months	• Pre-Design, EIR, Public Outreach, Permitting – 24 months • Detailed Design and Construction – 22 months • Total Duration = 46 months	• Pre-Design, IS/MND, Permitting – 12 months • Detailed Design and Construction – 20 months • Total Duration = 32 months	• Pre-Design, IS/MND, Permitting – 13 months • Detailed Design and Construction – 18 months • Total Duration = 31 months	• Pre-Design, EIR, ROW Acquisition, Permitting – 18 months • Detailed Design and Construction – 24 months • Total Duration = 36 months
Relative Regulatory Complexity	• IS/MND • SF RWQCB General Water Reuse Permit • Modify SJ/SC WPCP Discharge Permit - Metals	• EIR (recharge) • DHS/RWQCB GW Recharge Permit • Modify SJ/SC WPCP Discharge Permit – Metals	• EIR (streamflow) • SF RWQCB General Water Reuse Permit • Modify SJ/SC WPCP Discharge Permit – Metals	• EIR (streamflow/wetland) • New Master Reclamation Permit with Central Coast RWQCB	• EIR (streamflow/wetland & pipeline construction) • Complex RWQCB Permits – two regions • Modify SJ/SC WPCP Discharge Permit – Metals

Full Scale Alternative 3 - 11 MGD ARWT Plant at the SCRWA WPCP

- This project uses 40 percent RO treatment and no UV, a tailored process that is appropriate for local groundwater conditions in the less sensitive Llagas subbasin.
- This project would provide valuable new information from streamflow and wetlands uses, as well as expanded information on agricultural uses.
- This project has a good average annual production efficiency and relatively low cost, making it an appropriate candidate as a near term alternative.
- This project has limited growth potential due to the limitations in wastewater supply in the South County.

Full Scale Alternative 4 - 11 MGD ARWT Plant at SCRWA and 25 MGD ARWT Plant at SJ/SC WPCP

- This project has a very high cost of construction, and may not be a viable candidate, even as a long-term option.
- This project would allow extensive North County recycled water supplies to meet broad South County demands, where current supplies are limited by wastewater flows.

8.2.2 Full Scale Projects - Recommendations

Based on the above findings, the District and consultant team determined that Full Scale Alternatives 2 and 3 are the most appropriate for further consideration in the near term for the following primary reasons:

- These two projects can provide an excellent first step into advanced recycled water treatment without committing the District to higher levels of treatment requirements.
- These two projects are relatively lower cost options, have higher production efficiencies, and provide many opportunities for partnering, cost sharing, and external funding.
- These two projects would provide expanded information and understanding of recycled water uses and are not anticipated to face high levels of public opposition, based on stakeholder feedback.
- These projects are in areas with a considerable recycled water market, and are good building blocks in working toward the District's recycled water use targets over the long term.

8.2.3 Integration with Other Initiatives

It is recommended that Full Scale Alternatives 2 and 3 be further evaluated with respect to coordination with the varied initiatives and activities within and external to the District that could impact project implementation. Listed below are a number of on-going efforts to be considered.

- ***Board of Directors Recycled Water Target Levels*** – To align project scheduling and prioritization to conform to Board policy.
- ***Integrated Water Resources Planning*** – To integrate recycling with other water supply initiatives.

- ***Community Education/Outreach*** – To include public outreach in the early planning stages of recycled water projects.
- ***Recycled Water Collaborative Effort*** – To assure District recycled water efforts are coordinated with local water recycling community, such as municipalities, producers, and retailers, including the SBWR, SCRWA, Sunnyvale, Palo Alto in Santa Clara County, and the Bay Area Regional Water Recycling Program (BARWRP).
- ***Groundwater Protection*** – To coordinate activities with the Groundwater Protection Unit and maximize benefit from on-going research within and external to the District.
- ***Fisheries and Aquatic Habitat Collaborative Effort*** – To incorporate on-going research related to streamflow uses and environmental litigation status.
- ***Water Rights*** – To ascertain potential impacts on recharge or streamflow augmentation uses.
- ***Coyote Valley Master Planning*** – To blend planning on Coyote Valley projects with master planning efforts, including potential for funding recycled water projects with developer contributions or fees.
- ***San Luis Low Point Study*** - To provide multi-benefit uses or conjunctive uses.

It should be noted that the project team regards all of the other alternatives considered, both demonstration scale and full scale, as feasible and worthy of further consideration. During the coordination efforts described above, new information may arise that may alter the factors and issues affecting the current recommendation and render other alternatives more suitable than currently considered.

8.2.4 Next Steps

The following next steps are recommended for proceeding with the implementation of advanced recycled water treatment in the County:

- Continue coordination and integration with other District Programs;
- Identify funding sources, including grants and partnerships with other agencies;
- Expand its public outreach efforts; and
- Prepare engineering documents and supporting environmental documentation, both precursors to project permitting and construction.

The integration of these key steps will assure that the District utilizes advanced recycled water treatment as a part of a "master planned" effort that makes the most effective use of District resources and maximizes the benefit gained from other efforts within and external to the District.

8.2.5 Recommended Areas of Further Study

The following list includes several areas to be studied in further detail to address some of the issues not researched fully under this study.

General

- Conduct additional research on estimated uses, peak demands, and average annual water needs to confirm conceptual information included in the study. This clarification is needed to relate to irrigation, industrial, and streamflow augmentation uses.
- Develop more detailed cost estimates of water distribution costs for each project, to assure all costs are included, such as pumping, storage, and transmission and distribution pipelines.
- Finalize plant siting and research land acquisition requirements for facilities and pipelines. No costs have been included for these requirements in current estimates.

Alternative 2 – Coyote Valley

- SBWRP distribution system, including the pumping and storage capacity of the Silver Creek pipeline and other conveyance systems that may be needed to serve growing Coyote Valley demands.
- Consideration of alternative sites for Coyote Valley projects, such as locations further south of the residential areas and closer to Anderson Reservoir. These locations may avoid local opposition to further industrial projects in the vicinity of MEC and may provide further opportunities for conjunctive use with the District's surface water supplies.
- Re-establish contact with Calpine to confirm avoided cost information.
- Funding opportunities, including instituting developer fees to reimburse the District for recycled water infrastructure required to meet increased demands.
- Further evaluation of the capacity of the San Jose sewage conveyance system as it relates to brine handling for this alternative.

Alternative 3 – SCRWA

- Confirm quantities of recycled water capable of being used for streamflow augmentation and determine whether this use qualifies as offsetting other water use in the County.
- Coordinate with SCRWA on the planning of wetlands on the Pajaro River to receive effluent.
- Evaluate the availability of evaporation ponds at SCRWA.
- Keep abreast of SCRWA's plans to expand their tertiary-treatment facilities, so the duplicate treatment capacity is not constructed, eliminating the estimated avoided costs.